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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR		ATTORNEY DOCKET NO.
09/177,814	10/23/98	GILTON	T	3530US(97-12

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EXAMINER	
GABEL,G	
ART UNIT	**PAPER NUMBER**
1641	16

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Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trad marks

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1- File Copy

Office Action Summary	Application No.	Applicant(s)	
	09/177,814	GILTON, TERRY L.	
	Examiner	Art Unit	
	Gailene R. Gabel	1641	

-- The MAILING DATE of this communication app ars on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 April 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-11,13-44,46,48-64,66-74 and 105-107* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-11,13-44,46,48-64,66-74 and 105-107* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

15) ☒ Notice of References Cited (PTO-892)

16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .

18) ☐ Interview Summary (PTO-413) Paper No(s). _____ .

19) ☐ Notice of Informal Patent Application (PTO-152)

20) ☐ Other: .

DETAILED ACTION

Amendment Entry

1. Applicant's amendment and response filed 4/16/01 in Paper No. 15 is acknowledged and has been entered. Claim 1 has been amended. Currently, claims 1, 3-11, 13-44, 46, 48-64, 66-74 and 105-107 are pending and under examination.

Rejections Withdrawn

2. In light of Applicant's amendment and argument, the rejection of claims 1, 3-7, 9-11, 13-15, 18-19, 21-22, 25, 29, and 61 under 35 U.S.C. 112, second paragraph, is hereby, withdrawn.

3. In light of Applicant's argument, the rejection of claims 1, 3-4, 7-9, 18-20, 25-26, 29-32, 34-35, 38-39, 50-52, 56, 64, 66, 69, 71, and 73 under 35 U.S.C. 102(b) as being *inherently* anticipated by Isaka et al. (US 5,482,598), is hereby, withdrawn.

4. In light of Applicant's argument, the rejection of claims 14-15, 16-17, 21, 40-41, 43-44, 54-55, and 70 under 35 U.S.C. 103(a) as being unpatentable over Isaka et al. (US 5,482,598) in view of Miura et al. (US 5,132,012) is hereby, withdrawn.

5. In light of Applicant's argument, the rejection of claims 13, 21, 41, 53, and 70 under 35 U.S.C. 103(a) as being unpatentable over Isaka et al. (US 5,482,598) in view of Wang et al. (US 5,663,488) is hereby, withdrawn.

6. In light of Applicant's argument, the rejection of claims 33, 74, and 105-107 under 35 U.S.C. 103(a) as being unpatentable over Isaka et al. (US 5,482,598) in view of Turner et al. (US 5,885,869) is hereby, withdrawn.

7. In light of Applicant's argument, the rejection of claims 5-6, 10-11, 27-28, 36-38, 46, 48-49, 57-63, 67-68, and 72 under 35 U.S.C. 103(a) as being unpatentable over Isaka et al. (US 5,482,598) or if necessary, Northrup et al. (US 5,882,496) in view of Turner et al. (US 5,885,869) and in further view of Sunzeri (US 5,536,382) and Swedberg et al. (US 5,571,410) is hereby, withdrawn.

8. In light of Applicant's argument, the rejection of claims 22-24, and 42 under 35 U.S.C. 103(a) as being unpatentable over Isaka et al. (US 5,482,598) in view of Northrup et al. (US 5,882,496) is hereby, withdrawn.

Rejections Maintained

9. Claims 105-107 are rejected under 35 U.S.C. 103(a) as being unpatentable over Isaka et al. (US 5,482,598) in view of Turner et al. (US 5,885,869) for reasons of record.

New Grounds of Rejection

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

> invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 1, 3-5, 7-11, 13, 16, 18-20, 25-26, 29-32, 34-35, 38-39, 43, 46, 48-53, 56, 64, 66, 69-71, and 73 are rejected under 35 U.S.C. 103(a) as being unpatentable over Isaka et al. (US 5,482,598) in view of Overton et al. (US 5,611,846).

Isaka et al. disclose a chromatograph apparatus comprising a microchannel element formed on a semiconductor substrate. Specifically, the apparatus includes a semiconductor substrate and a matrix (microchannel) which extends across the substrate. The semiconductor substrate comprises of silicon (see column 6, lines 5-7). The matrix is formed with a desired pattern, i.e. linear, circular, on the semiconductor substrate by incorporating a porosity thereon in order to create a porous portion with increased pore size and extended branching of the pores on the semiconductor surface (see Abstract and column 1, lines 35-46). The length of the matrix channel is not limited although its length is preferably larger than its diameter (see column 2, lines 18-25). The porosity is preferably 10-90% (see column 2, lines 60-63). Optimal pore size and pore shape can be achieved in accordance with the substance to be separated and measured, i.e. selecting the type and concentration of a dopant (see column 3, lines 35-42). A thin semiconductor substrate layer may be formed by ion injection after formation of a silicon dioxide layer by thermal oxidation (see column 4, lines 53-55). The apparatus is applicable for use in solid-gas separation, solid-liquid separation, liquid-liquid separation, and gaseous separation. The separation makes use of the difference in flow rate between gases and liquids or in reactions (enzyme reaction) involving capture substrate (absorptivity involving immobilized enzyme) (see column 3,

lines 1-14 and 50-54). In liquid chromatographs, an inlet port of the apparatus is coupled to a pump (migration facilitator) into the porous channel to identify difference in elution time between two liquids using differential refractometer (see column 5, lines 17-29). Isaka et al. also disclose ion column detection performed on a capillary, i.e. absorption detector (see column 3, lines 16-24). Finally, Isaka et al. teach incorporation of a sealing element (cover) consisting of a single-crystal silicon film on the silicon substrate on which the matrix is formed (see column 5, lines 38-49).

Isaka et al. differ in failing to teach forming at least two porous microchannels in the silicon substrate.

Overton et al. disclose a chromatograph apparatus including a separation column that separates sample mixtures into individual components (see column 1, lines 23-25). The separation column is capable of separating analytes from gaseous, liquid, or solid phases (see column 3, lines 1-3). The apparatus also includes a microprocessor that is capable of controlling temperature, sample pumps, and gas pressures, and a valve pneumatics system that injects samples containing analyte into the column (see column 4, lines 49-52). Overton et al. disclose that the chromatograph may have different specific configurations to fit intended uses such as the incorporation of two parallel different columns in an analyzer module with corresponding detectors alongside thereto; i.e. a small scale micro thermal conductivity detector (see column 9, lines 30-46 and column 11, lines 53-59). Figure 2(b) illustrates multiple injectors and multiple columns in the apparatus.

One of ordinary skill in the art at the time of the instant invention would have reasonable expectation of success in incorporating multiple separation columns such as taught by Overton into the miniaturized chromatograph apparatus such as taught by Isaka because Overton specifically taught that multiple columns in various configurations for different intended applications can be incorporated into his chromatograph apparatus suggesting that fabrication and use of multiple columns in separation chromatographs is well within ordinary skill.

11. Claims 14-15, 17, 21, 40-41, 44, and 54-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Isaka et al. (US 5,482,598) in view of Overton et al. (US 5,611,846) as applied to claims 1, 3-5, 7-11, 13, 16, 18-20, 25-26, 29-32, 34-35, 38-39, 43, 46, 48-53, 56, 64, 66, 69-71, and 73 above, and further in view of Miura et al. (US 5,132,012).

Isaka et al. and Overton et al. have been discussed supra. Isaka et al. and Overton et al. differ in failing to teach incorporating a field effect transistor detector, memory device, and controls into the apparatus.

Miura et al. disclose a miniaturized sample separator in the form of a liquid chromatograph comprising an analyzing chip in which the capillary flowpath is formed in a substrate and a field effect transistor detector disposed downstream of the capillary (see Abstract). The substrate is made of silicon and further has an insulative membrane formed of silicon dioxide (see column 3, line 51 to column 4, line 7). Both the column for separation and the field effect transistor detector are formed integrally

with the substrate. After the silicon oxide layer has been formed on the capillary groove, a stationary phase is formed. A valve is connected to a first end of the flow path in the sample application area (sample introduction pipe) where a sample is selectively introduced into the flowpath. A separation carrier solution (carrier gas/ vacuum source) is fed under pressure by a feed pump and then discharged from a drain after having passed through the flowpath. Miura et al. further teach a sealing element (seal plate) such as borosilicate glass for sealing the opening portion of the groove portion to define the flow passage for a liquid sample. The liquid chromatograph also comprise a memory (control) device and an output device such as a data processor which is connected to the detector for detecting separated constituents (see column 5, line 63 to column 6, line 22). Figures 4A and 4B illustrate an electrical conductivity detector which comprise voltage application and current detection components, i.e. electrodes. Figure 9 shows a schematic view of the overall flow passage of the liquid chromatograph.

One of ordinary skill in the art at the time of the instant invention would have reasonable expectation of success in incorporating specific chromatography device elements such as those taught by Miura into the miniaturized chromatograph apparatus with porous silicon channels such as taught by Isaka which may include multiple separation columns such as suggested by Overton because Miura specifically taught that such elements can be incorporated into miniaturized chromatograph apparati. One of ordinary skill in the art at the time of the invention would have been motivated to combine the teaching of Miura into the chromatograph apparatus of Isaka and Overton

because Miura recognized and solved technical difficulties in miniaturizing analyzers by incorporating these necessary elements into his device (rather than providing them independently of each other) and Isaka recognized and specifically suggested advancement in technology through the use of porous silicon for significantly enhancing separation, augmenting adsorption, differentiating flow rate in liquid or gaseous samples in apparati of miniature scales.

12. Claims 21 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Isaka et al. (US 5,482,598) in view of Overton et al. (US 5,611,846) as applied to claims 1, 3-5, 7-11, 13, 16, 18-20, 25-26, 29-32, 34-35, 38-39, 43, 46, 48-53, 56, 64, 66, 69-71, and 73 above, and further in view of Wang et al. (US 5,663,488).

Isaka et al. and Overton et al. have been discussed supra. Isaka et al. and Overton et al. differ in failing to teach integration of a migration facilitator into the separation chromatograph.

Wang et al. disclose a migration facilitator (pumping assembly) incorporated into a separation column and thermal device for use in selective control of thermal isolation of the thermal zone as well as effecting selective amount of gas pressure in an enclosed cavity (see Abstract). The pumping element comprises an element in the form of a tubular or planar palladium structure. Wang et al. disclose that the migration facilitator controls the extent of thermal isolation by changing the gas pressure in the cavity thereby changing the amount of heat transfer between the separation column and housing so as to reduce the need for operation of the thermal device (see column 2,

lines 1-54). The migration facilitator also includes a control (check) valve for venting or purging gasses form the closed cavity, a vacuum (or near vacuum) source for use in high vacuum pumps for altering the concentration of gas within the cavity volume (see column 4, lines 4-59). Wang further disclose that a thermal conductivity detector is integrated into the chromatograph for determining physicochemical properties of the fluid stream which exits the separation column (see column 10, line 60 to column 11 line 33).

It would have been obvious to one of ordinary skill in the art at time of the invention to incorporate a migration facilitator as taught by Wang into the apparatus of Isaka and incorporate thereto a plurality of columns such as suggested by Overton because Wang specifically suggested application of his pump assembly to miniaturized chromatographic apparati capable of regulated flow such as taught by Isaka. One of ordinary skill in the art at the time of the invention would have been motivated to incorporate the migration facilitator of Wang into a chromatographic device such as taught by both Isaka and Overton because Isaka specifically taught that porous silicon has established porosity with enhanced capacity for separation in miniature scales; therefore, augmenting adsorption and differentiating flow rates in liquid or gaseous samples in separation apparati of miniature scale while effecting selective pressurization such as in the teaching of Wang.

13. Claims 33 and 74 are rejected under 35 U.S.C. 103(a) as being unpatentable over Isaka et al. (US 5,482,598) in view of Overton et al. (US 5,611,846) as applied to

claims 1, 3-5, 7-11, 13, 16, 18-20, 25-26, 29-32, 34-35, 38-39, 43, 46, 48-53, 56, 64, 66, 69-71, and 73 above, and further in view of Turner et al. (US 5,885,869).

Isaka et al. and Overton et al. have been discussed supra. Isaka et al. and Overton et al. differ in failing to teach the porous regions as being formed from hemispherical grain silicon.

Turner et al. disclose a method which enables uniformly doping hemispherical grain polycrystalline silicon (HSG) or a top roughened polysilicon layer independent of other layers in a semiconductor substrate (see Abstract). Initially, a semiconductor substrate having a silicon dioxide layer formed superadjacent a polycrystalline layer is provided, preferably in a chamber. Subsequently, a doped rough silicon layer is formed in situ superadjacent the silicon dioxide layer which is accomplished by depositing a silicon layer superadjacent the silicon dioxide layer and exposing the silicon layer to a source gas. The step of roughening is achieved by vacuum annealing an amorphous layer using rapid thermal chemical vapor deposition techniques or low pressure chemical vapor deposition (see column 3, lines 7-23).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teaching of Turner in doping hemispherical grained silicon into the chromatograph apparatus taught by Isaka which may include multiple separation columns such as suggested by Overton because Turner specifically disclosed that HSG can be uniformly doped on a silicon layer of a semiconductor substrate and Isaka specifically taught forming the porous silicon microchannels into a semiconductor substrate. One of ordinary skill in the art at the time of the invention

would have been motivated to incorporate the teachings of Turner in doping hemispherical grained silicon into the miniaturized separation device of Isaka and Overton because Isaka recognized and specifically taught advantage introduced through the use of porous silicon, such as HSG, in significantly enhancing separation, augmenting adsorption, differentiating flow rate in liquid or gaseous samples in apparati of miniature scales.

14. Claims 22-24, and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Isaka et al. (US 5,482,598) in view of Overton et al. (US 5,611,846) as applied to claims 1, 3-5, 7-11, 13, 16, 18-20, 25-26, 29-32, 34-35, 38-39, 43, 46, 48-53, 56, 64, 66, 69-71, and 73 above, and further in view of Northrup et al. (US 5,882,496).

Isaka et al. and Overton et al. have been discussed supra. Isaka et al. and Overton et al. differ in failing to teach the migration facilitator as comprising electrodes disposed into the porous region of the chromatograph.

Northrup et al. disclose fabrication and use of porous silicon structures to increase surface area of miniaturized electrophoresis devices and filtering or control flow devices (see Abstract). Northrup et al. specifically disclose that porous silicon which is fabricated from crystalline silicon have very small pore diameters so that they can be produced with relatively high degree of uniformity and control (see column 1, lines 27-55). Northrup et al. teach that because of its high surface area and specific pore size, porous silicon can be utilized for a variety of applications on a miniature scale for significantly augmenting adsorption, vaporization, desorption, condensation, and

flow of liquids and gasses while maintaining the capability of modification such as being doped or coated using conventional integrated circuit and micromachining (see Summary). Electrodes within or adjacent the porous membrane can be used to control flow or electrically charged biochemical species such as in electrophoresis (see column 5, lines 21-67). Figure 3 illustrates porous silicon embodiment on a controlled flow interface device. Figure 8 illustrates a porous silicon electrophoresis device. A negative electrode is formed at one end (inlet) of the porous silicon column and a positive electrode is formed is formed at an opposite end (outlet) of porous silicon columns, thereby forming microelectrophoresis channels (see column 7, lines 38-50).

One of ordinary skill in the art at the time of the instant invention would have reasonable expectation of success in incorporating electrodes such as taught by Northrup into the miniaturized apparatus taught by Isaka which may include multiple separation columns such as suggested by Overton because Northrup specifically taught that electrodes can be disposed into miniaturized porous silicon structures such as in electrophoresis devices suggesting that incorporation of electrophoretic elements in separation chromatographs is well within ordinary skill.

15. Claims 27-28, 36-37, and 67-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Isaka et al. (US 5,482,598) in view of Overton et al. (US 5,611,846) as applied to claims 1, 3-5, 7-11, 13, 16, 18-20, 25-26, 29-32, 34-35, 38-39, 43, 46, 48-53, 56, 64, 66, 69-71, and 73 above, in further view of Swedberg et al. (US 5,571,410).

Isaka et al. and Overton et al. have been discussed supra. Isaka et al. and Overton et al. differ in failing to teach antibody or antigen as the capture substrate for the miniaturized chromatograph.

Swedberg et al. teach a miniaturized planar column device for integrated sample analysis of analytes (see column 8, lines 5-38). Swedberg et al. specifically teach a stationary phase (sample treatment component) which performs a filtration function filled with a biocompatible porous medium of particles into which a capture function has been incorporated therein (see column 27, lines 33-61 and Example 1). Specifically, Swedberg teaches a stationary phase incorporated into a miniaturized affinity chromatography column onto which separation and capture functions are combined; the capture species (biological affiants) include antibodies, antigens, lectin, enzyme etc. (see column 27, lines 43-61 and Example 1). Swedberg et al. also disclose a "LIGA" process which is used to refer to a process of fabricating microstructures having high aspect ratios and increased structural precision in order to create desired uniformity in microstructures such as channels ports, apertures, and microalignment means (see column 13, lines 9-33).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the stationary phase in the porous matrix of the chromatographic separation apparatus taught by Isaka, which may include multiple separation columns such as suggested by Overton, with antigens and antibodies as taught by Swedberg in order to achieve performance of both filtration and capture function because Swedberg specifically suggested potential application of his teachings in monitoring biological

analyses as applied to liquid phase separation devices in the miniature scales such as taught by Isaka. One of ordinary skill in the art would have been motivated to incorporate the teachings of Isaka with biocompatible modification as taught by Swedberg because Isaka specifically taught that porous silicon has established porosity with enhanced capacity for separation, augmented adsorption, differentiation of flow rate in liquid or gaseous samples, thereby producing a highly versatile miniaturized chromatographic device capable of both enhanced partitioning and complexation reactions.

16. Claims 6, 57-63, and 72 are rejected under 35 U.S.C. 103(a) as being unpatentable over Isaka et al. (US 5,482,598) in view of Overton et al. (US 5,611,846) as applied to claims 1, 3-5, 7-11, 13, 16, 18-20, 25-26, 29-32, 34-35, 38-39, 43, 46, 48-53, 56, 64, 66, 69-71, and 73 above, and if necessary, Northrup et al. (US 5,882,496), in view of Turner et al. (US 5,885,869) and in further view of Sunzeri (US 5,536,382).

Isaka et al., Overton et al., Northrup et al., and Turner et al. have been discussed supra. Isaka et al., Overton et al. Northrup et al., and Turner et al. differ in failing to teach incorporating a control column into the separation device

Sunzeri discloses analysis of constituents of human biological fluids using capillary electrophoresis. Sunzeri specifically teaches the use of standard control to provide a standard for quantitation (see column 9, lines 28-67). Sunzeri further teaches that quantitation using internal and external standards is beneficial in assays where the sample matrix affects fluorescence sample quenching (see column 10, lines 1-34).

One of ordinary skill in the art would have reasonable expectation of success in incorporating internal standards or controls such as suggested by Sunzeri into the miniaturized chromatographic apparatus as taught by Isaka, which may include multiple separation columns such as suggested by Overton, because processing of internal controls, references, or standards into a chromatographic apparati for intended purpose of quality control monitoring is a conventional and standard laboratory practice to those well within ordinary skill.

Response to Arguments

17. Applicant's arguments with respect to 1, 3-11, 13-44, 46, 48-64, 66-74 and 105-107 have been considered but are not persuasive.

18. A) Applicant argues that Turner et al. which qualifies under a 35 USC 102 (e) rejection, does not qualify as prior art under 35 USC 103 (a) rejection. Specifically, Applicant argues that Turner which did not issue until 3/23/99 is commonly owned by Micron Technology to which the instant application is also assigned.

Based upon the earlier effective U.S. filing date, the Turner reference constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed

in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the subject matter of the reference and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(l)(1) and § 706.02(l)(2).

B) Applicant argues that Miura merely suggests association of a processor with the chromatograph. Applicant further argues that Isaka and Miura neither teach nor suggest a memory device in association with the separation device. Applicant also argues that Miura fails to teach or suggest a vacuum source that is in operative communication with the column chromatograph and that Miura only suggests the use of positive pressure to facilitate movement of sample.

In response, Miura teaches incorporation of a processor in communication with a detector disposed in the separation device and does not exclude disposing the processor into the substrate of the device. Inclusion of the processor onto the substrate of the device with the detector would otherwise have been an obvious design choice. Further, Miura et al. teach and suggest a migration facilitator comprising a pump that is fed under positive pressure into the feed pump to facilitate movement of the sample.

Alternatively, the claims rejected do not exclude use of positive pressure in facilitating migration of the samples through the column. Finally, in teaching that a processor is disposed into the device necessarily and inherently suggests incorporation of a memory element to be fully functional.

C) Applicant argues that Wang fails to teach or fairly suggest inclusion of a thermal detector on the substrate where the column chromatography is formed and a vacuum source that is operatively in communication with an end of the chromatography column. Applicant argues that Wang only teaches a thermal conductivity detector.

In response, Wang et al. disclose a thermal conductivity detector as being integrated into the separation column (see column 10, line 60 to column 11, line 33). Alternatively, the rejected claims do not exclude that the thermal detector in question as recited in the claims is not a thermal conductivity detector. Further, Wang et al. disclose a vacuum (or near vacuum) source for use in altering the concentration of gas within cavities of the separation column; the claims rejected, however, do not exclude use of such vacuum taught by Wang et al. in facilitating migration of the samples through the claimed column.

19. No claims are allowed.

Remarks

20. Prior art made of record are not relied upon but considered pertinent to the applicants' disclosure:

Annino et al. (US 5,340,543) disclose multiple separation columns on a chromatographic device (see columns 4, 6, and 10).

21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gailene R. Gabel whose telephone number is (703) 305-0807. The examiner can normally be reached on Monday to Thursday from 7:00 AM to 4:30 PM. The examiner can also be reached on alternate Fridays from 7:00 AM to 3:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le, can be reached on (703) 305-3399. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-4242.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0196.

5/1/01

Gailene R. Gabel
Patent Examiner
Art Unit 1641

LONG V. LE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1600

05/05/01